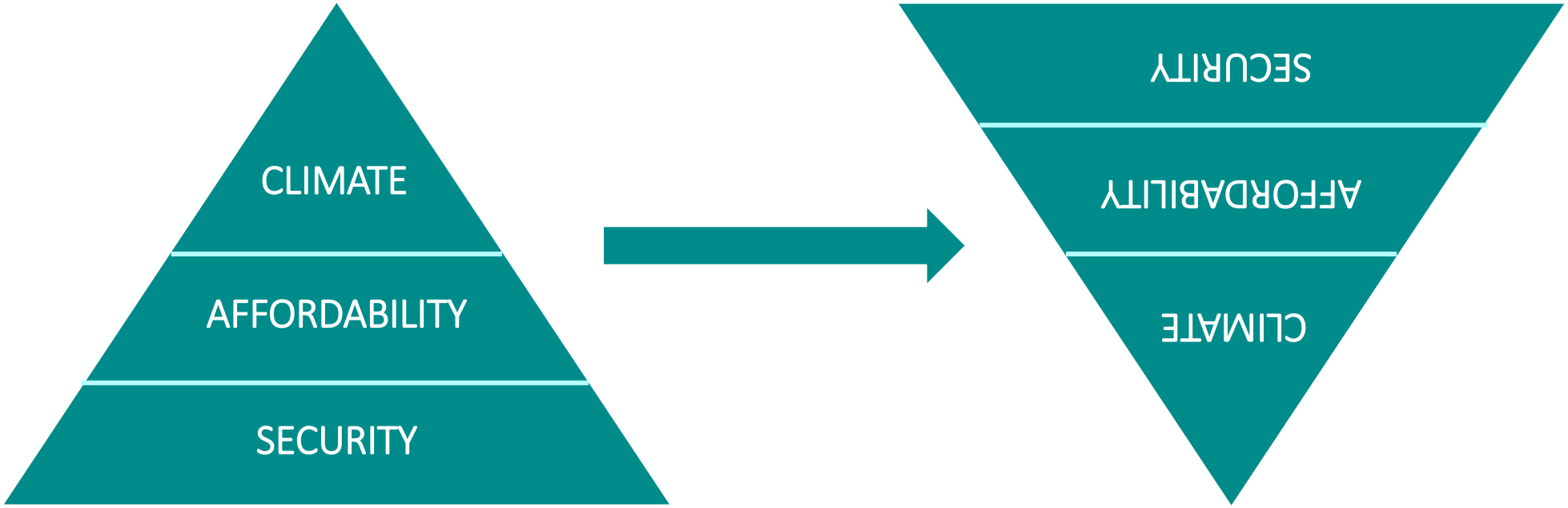
ENERGINET

KEYNOTE:
A HOLISTIC VIEW OF SYSTEMS INTEGRATION

Session Theme:

Dealing with a more complex set of planning and operational issues, ESI, and the never-ending search for flexibility

Antje Orths


CLIMATE
AFFORDABILITY
SECURITY
SECURITY
AFFORDABILITY
CLIMATE

NEW PERSPECTIVE

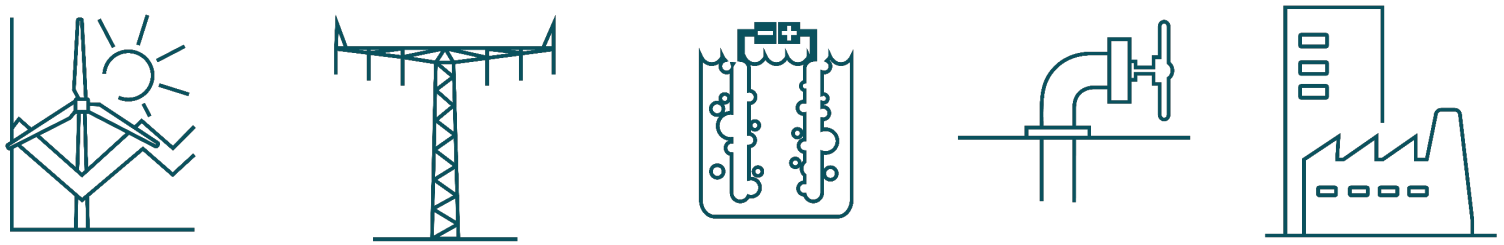
"Dealing with a more complex set of planning and operational issues, ESI, and the never-ending search for flexibility"

Before 24th February

- Driven by decarbonization
- Holistic across time, space and sectors:
  - Must function 20:50 today … and in 2050
  - in Finland and Portugal
  - electricity, gas, heating, transportation…

After 24th February

- Question of national security
- Shift of paradigm, new priorities
  - ESI: Synchronization of UA & MD 16.03.2022
  - Acceleration of planning
  - Resource question turned upside down



EC'S RE-POWER EU

URGENT ACTION ON PRICES

Keeping retail energy prices in check by confirming the possibility of price regulation to help protect consumers and our economy.

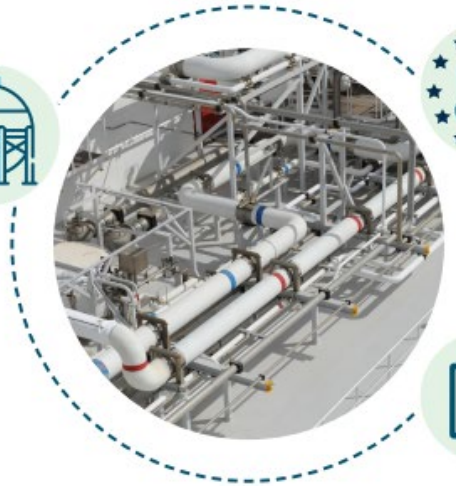
Guidance on temporary tax measures on windfall profits and use of emissions trading revenues, so governments can ease the pressure on household consumers.

State Aid measures: consultation with Member States on a potential Temporary Framework to grant aid to companies facing high energy costs.

Market actions assessing options to improve the electricity market design.

REFILLING GAS STORAGE FOR NEXT WINTER

A legislative proposal by April on minimum gas storage so Europe better controls its supply, establishing a 90% filling target by 1 October, designating gas storage as critical infrastructure, and allowing incentives for refilling.



Support to **coordinated gas refilling operations**, for example through joint procurement, collecting orders and matching supplies.

Continued **investigation into behaviour by operators**, notably by Gazprom.

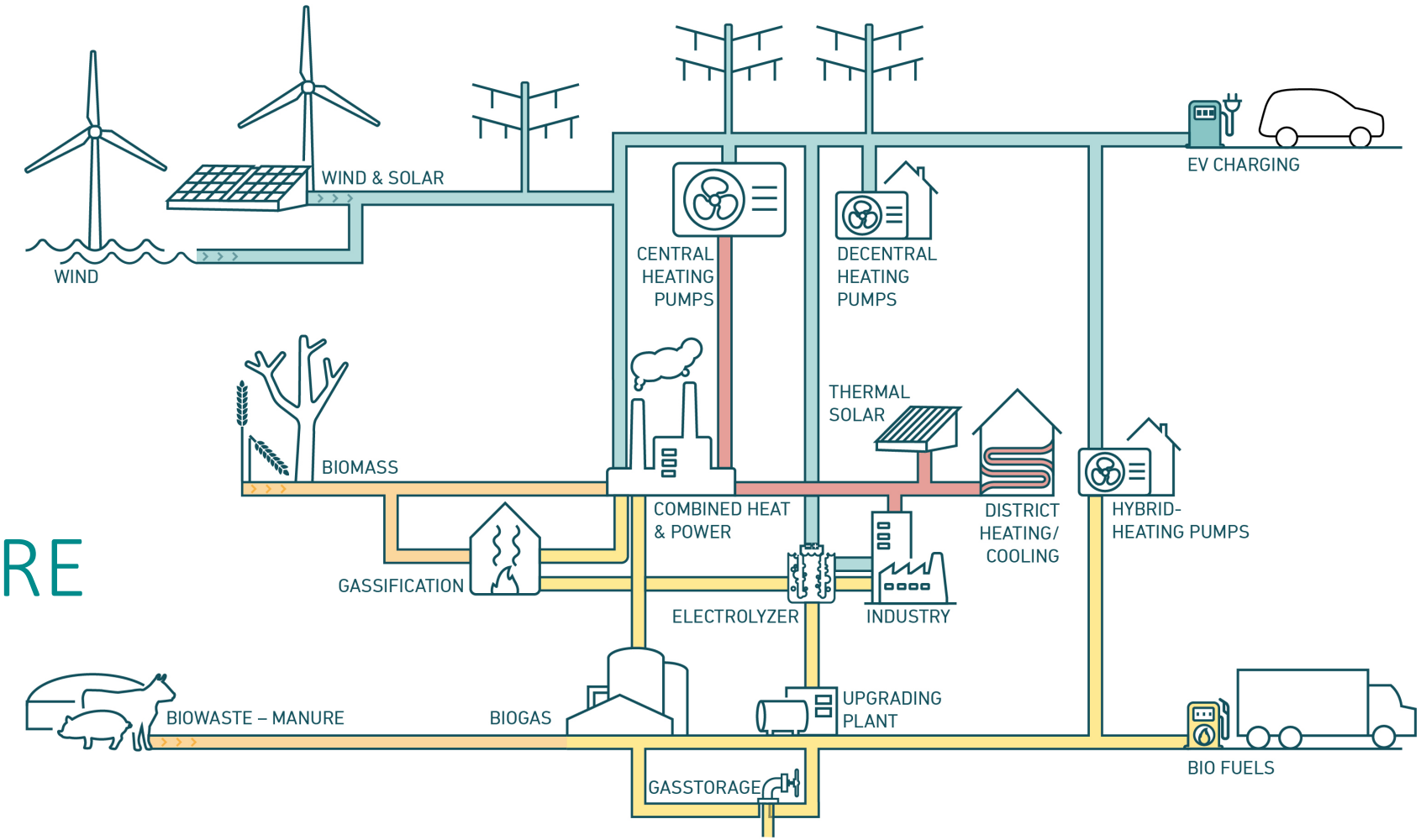
Joint European action for more affordable, secure energy (europa.eu)

EC’S RE-POWER EU

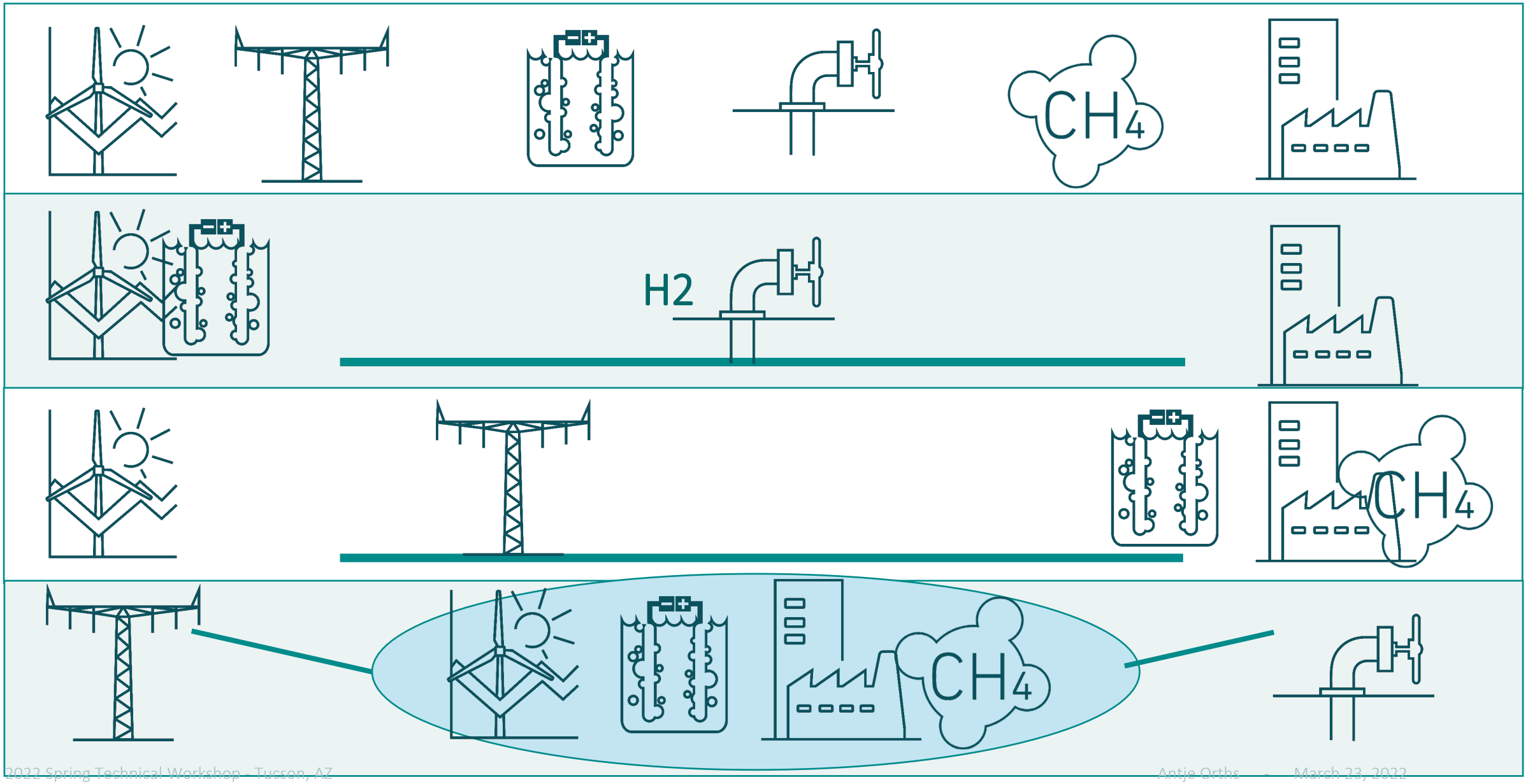
Joint European action for more affordable, secure energy (europa.eu)

Target
until recently

THE ENERGY SYSTEM OF THE FUTURE



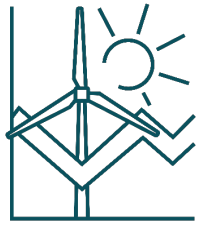
BUILDING BLOCKS & VARIANTS

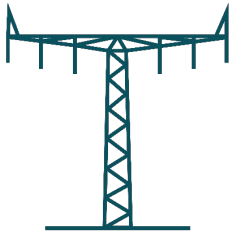


COMBINING SECTOR INFORMATION

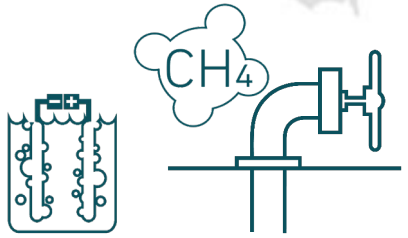
Energy Islands:
Huge production to come, exceeding peak demand

Electricity grid:
decomposing in sub-price areas

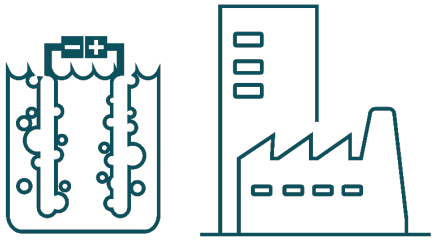


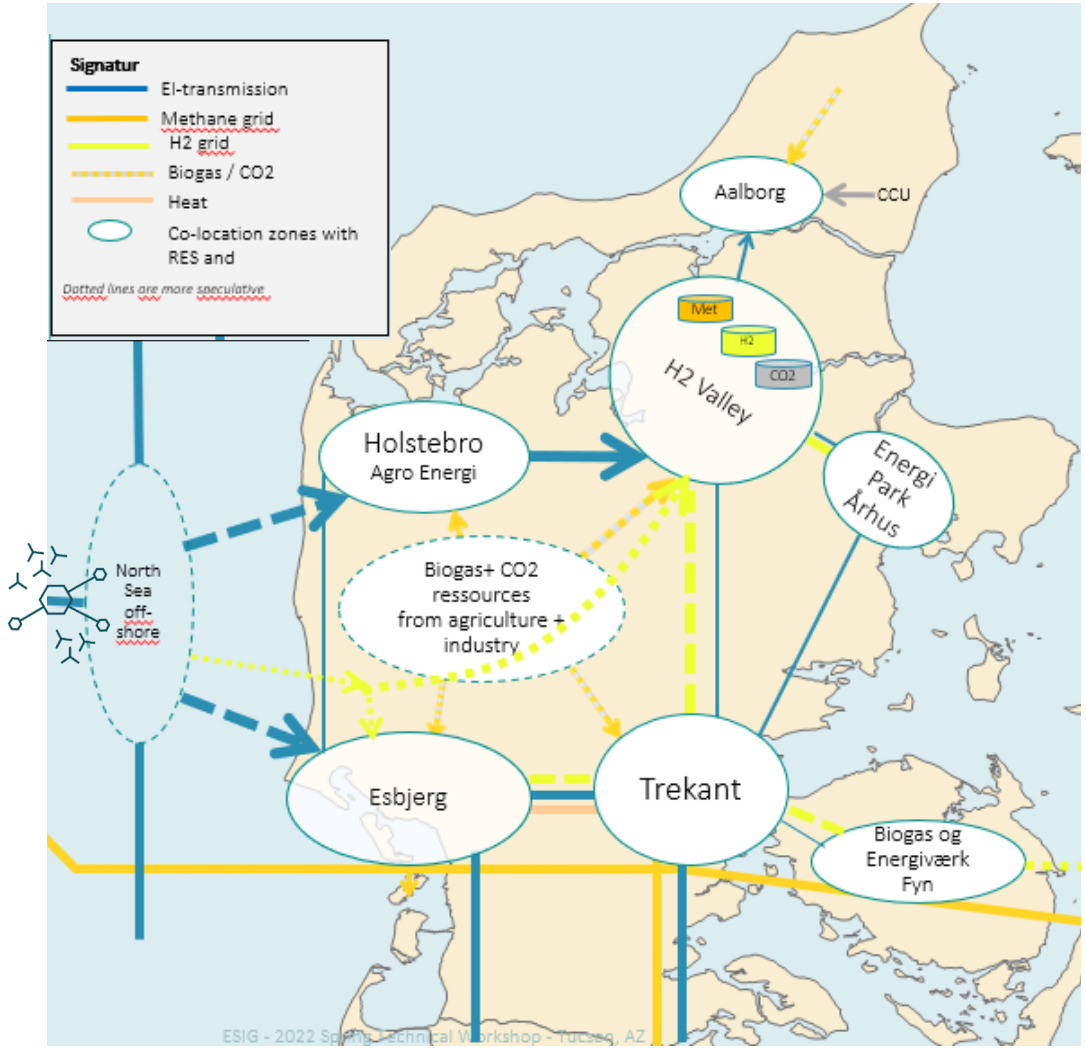


Biogas potential:
Providing carbon for syn-liquids



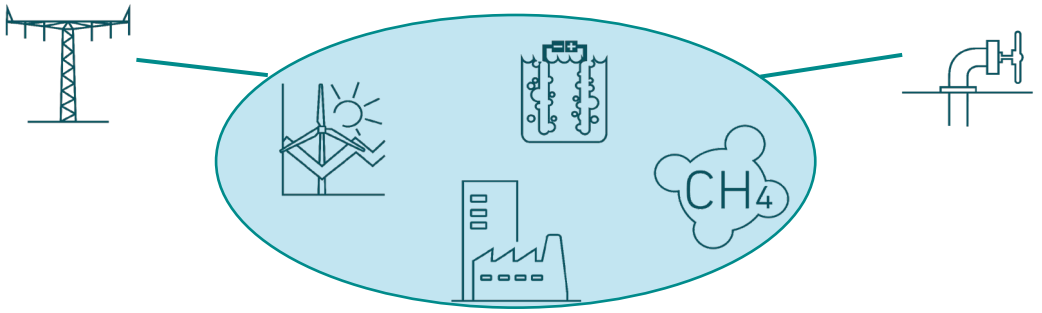
District heating use:
At large population centers

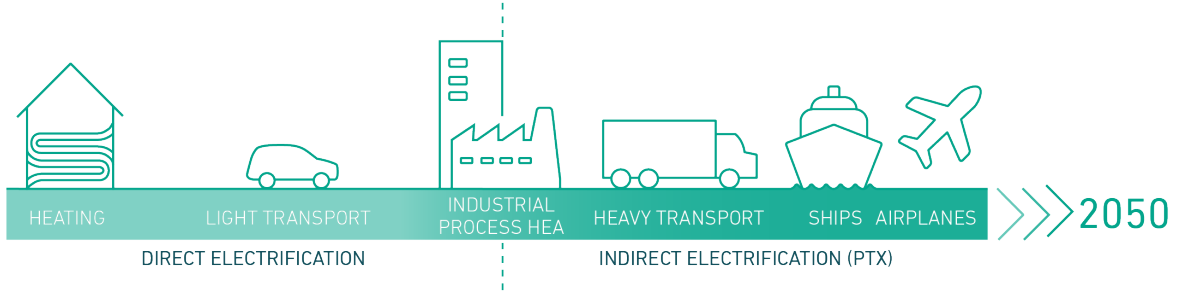




CO-LOCATION ZONES

… might evolve further





CAPACITY MAP

Information for new customers (producers and consumers)

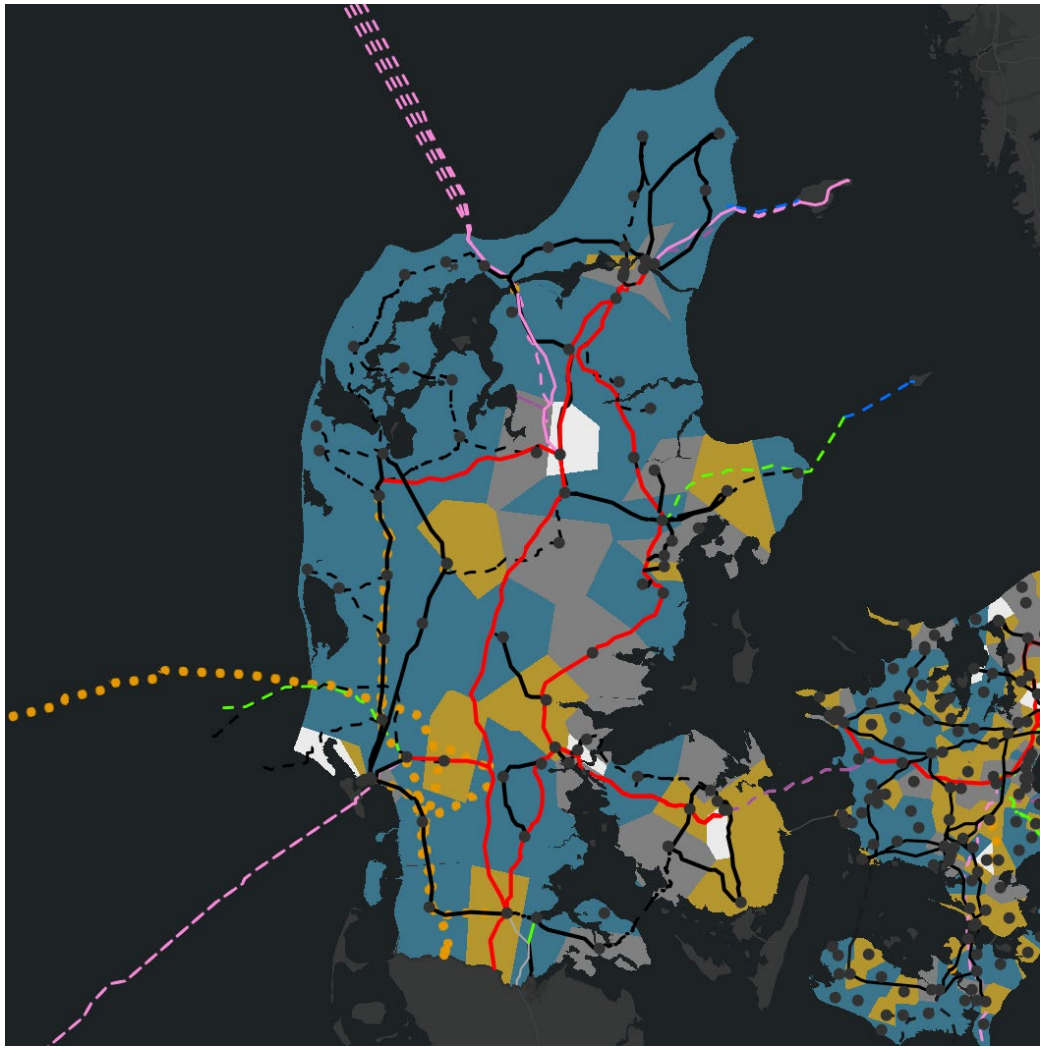
Expected dominating production per substation 2025 in Denmark: Direct Link

Color-code:

Blue: Wind

Yellow: PV

Grey: CHP



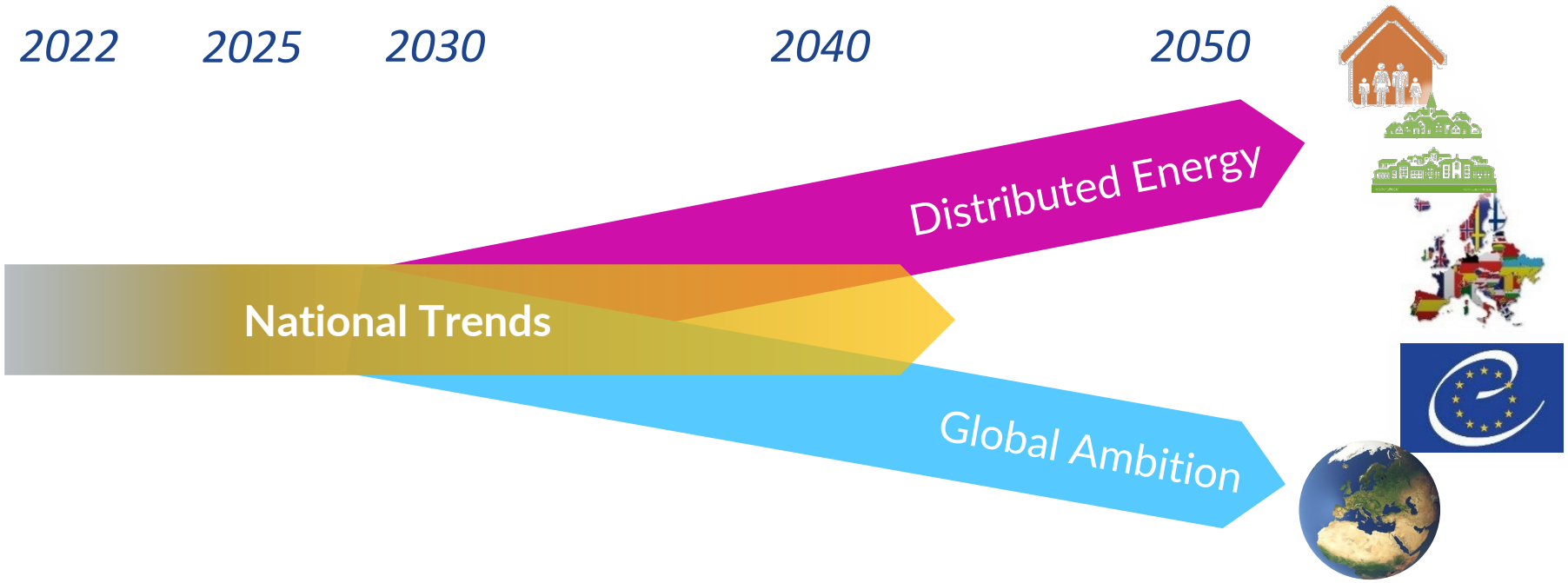
WWW.KAPACITETSKORT.DK

THE EUROPEAN ENERGY SYSTEM

According to the Draft Scenario Report

ENTSO-E / ENTSOG

Three Scenarios for the TYNDP 2022



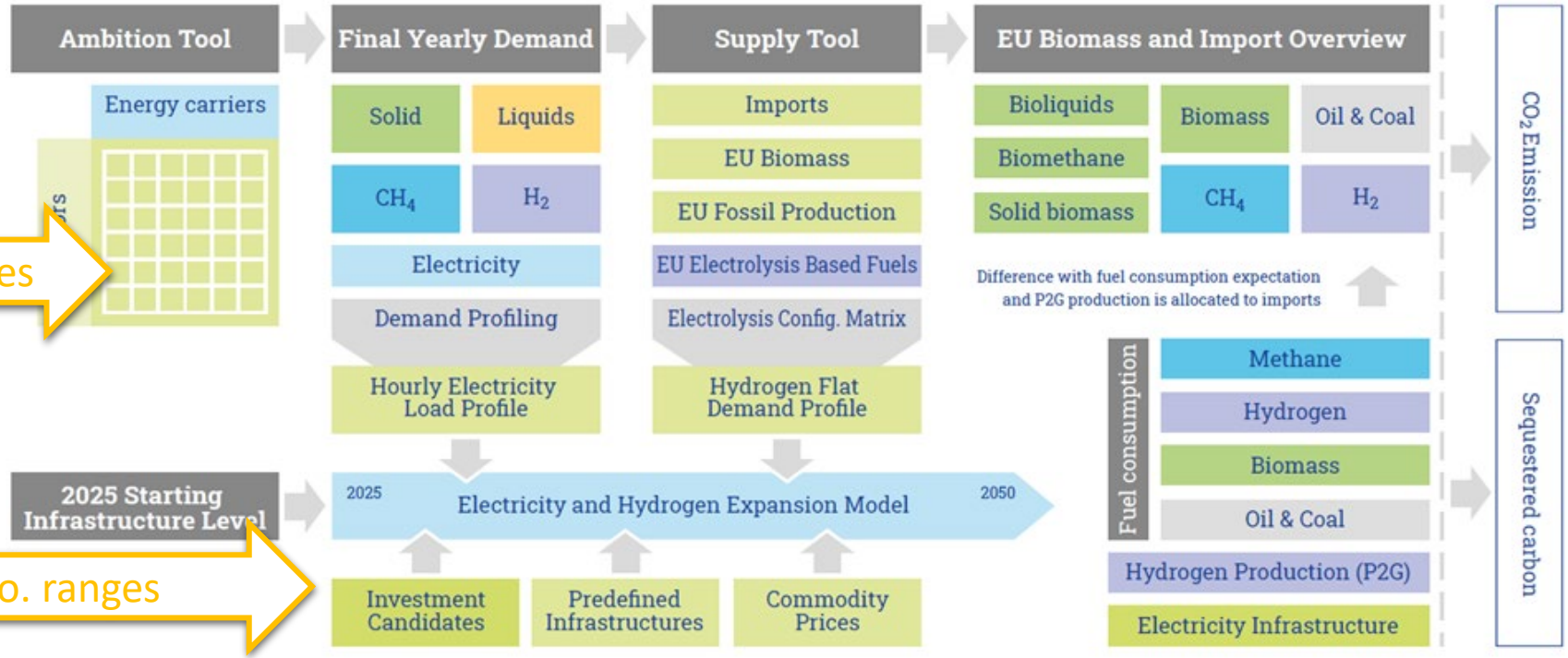
Higher European autonomy with renewable and decentralised focus

Aggregation of national policies and strategies as stated end of 2020

Global economy with centralised low carbon and RES options

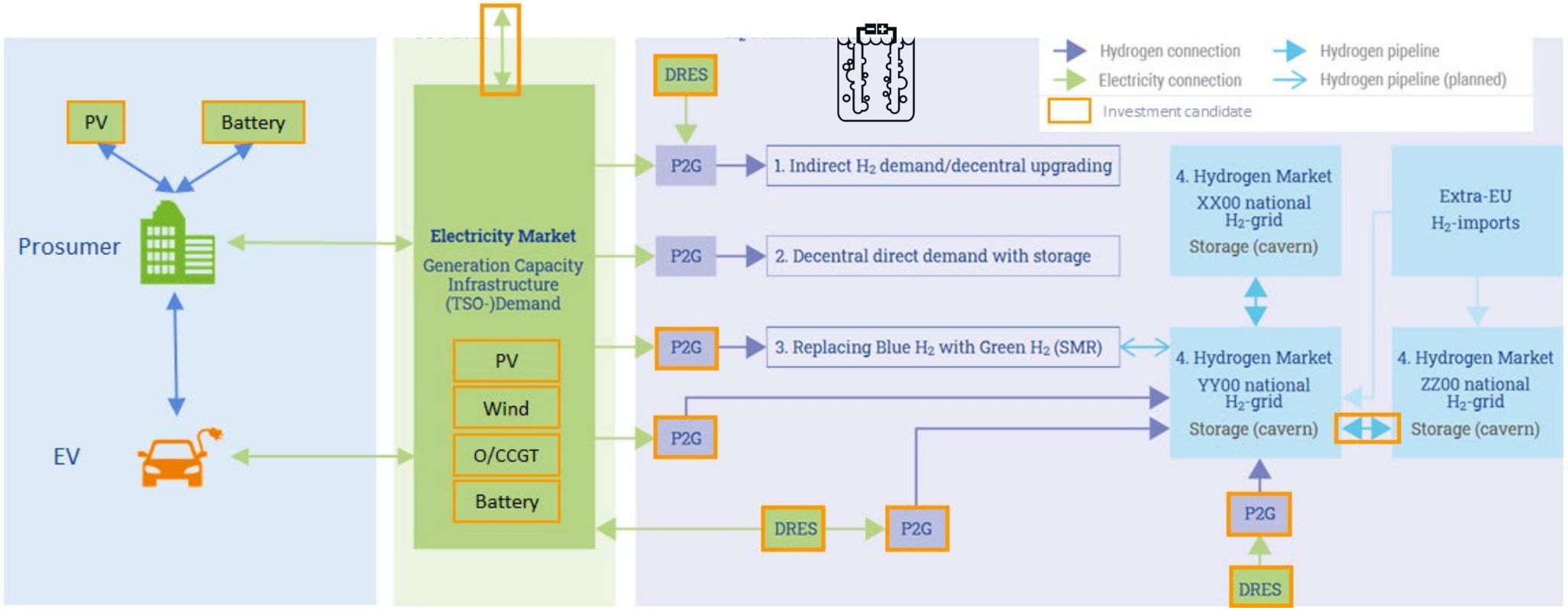
Building blocks of COP 21 scenario process

Final storyline report
April 2021
(resulting from public consultation)



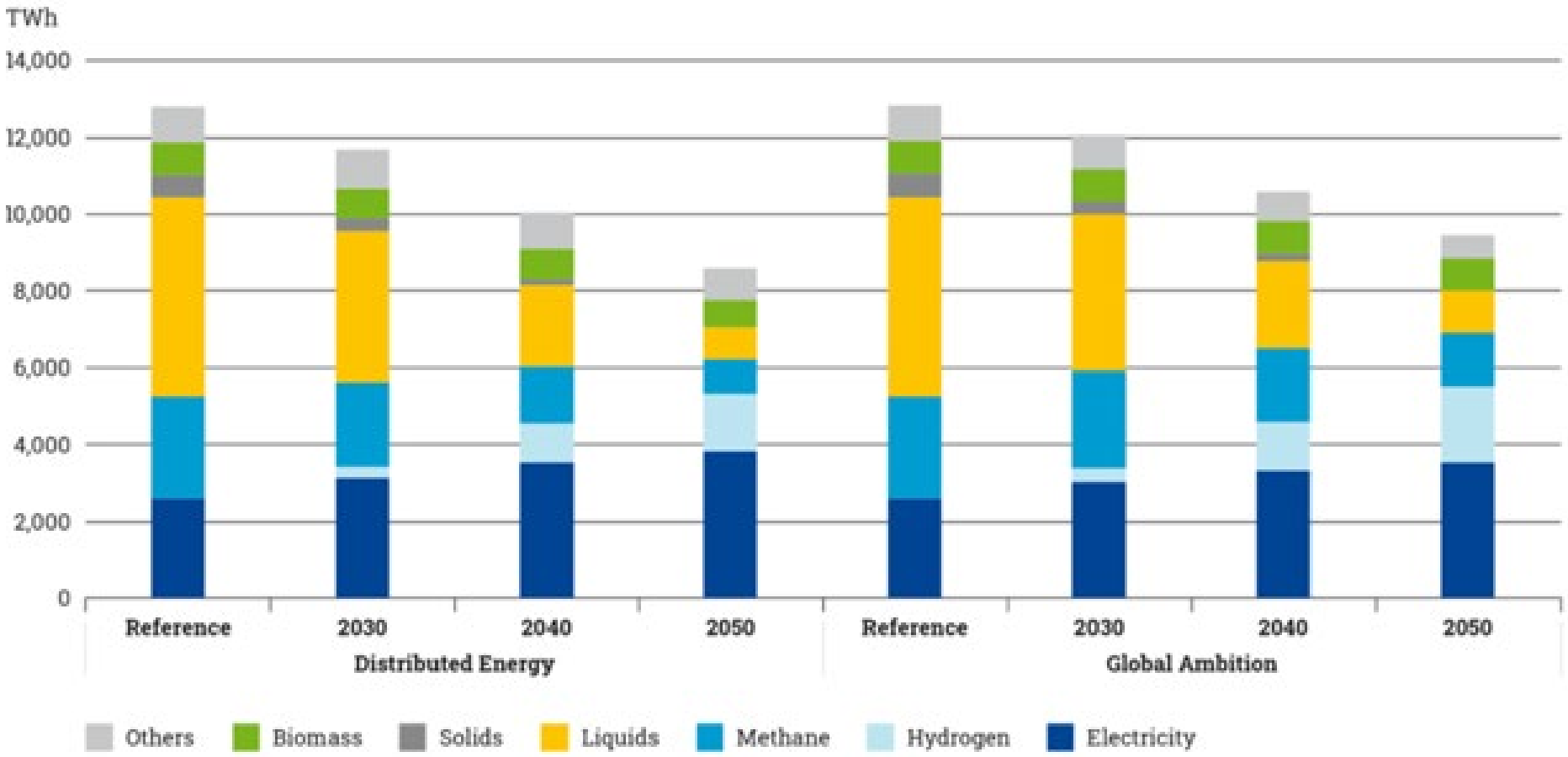
- The scenario building process consists in translating storylines into scenarios detailed enough to be used for infrastructure assessment in TYNDP
- The split of demand per carrier and sector (Ambition Tool) and the expansion of the electricity and hydrogen infrastructures are the key steps of this process

Overall modelling topology – Prosumers and P2X



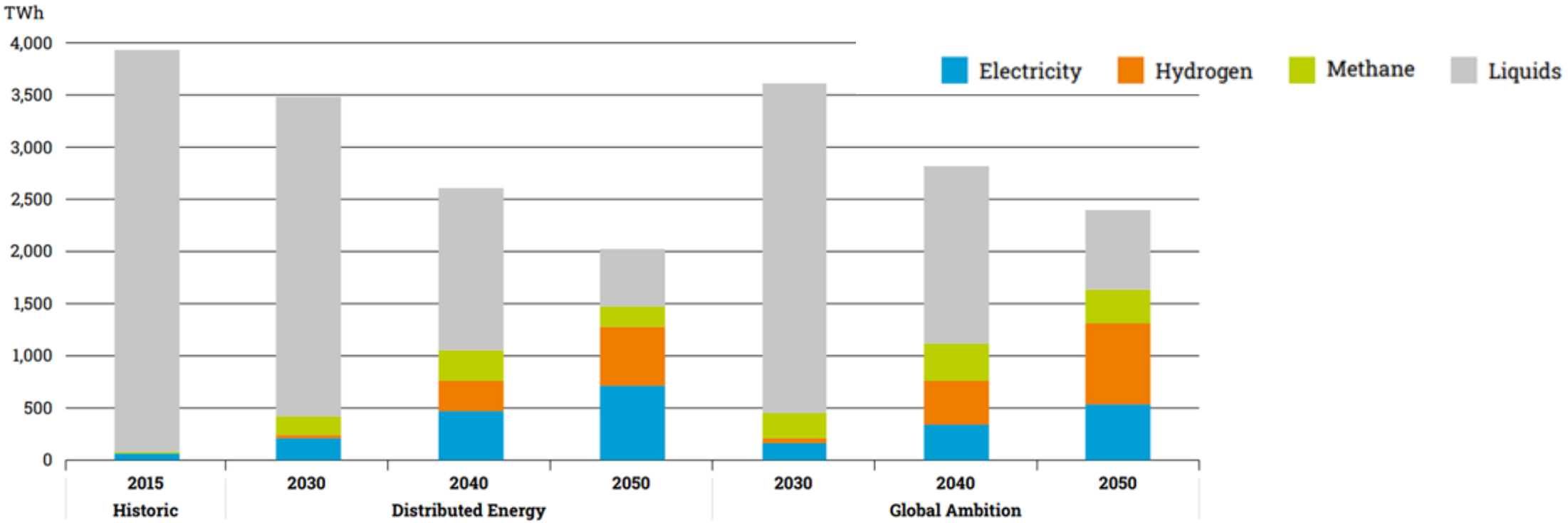
- Sector integration: focus on electrolysis, prosumer, EV
- A wide range of investment candidates and configurations: PV, wind, batteries, electricity and gas interconnections, gas O/CCGTs
- Hydro, biomass, small thermal and nuclear capacity are predefined in both scenarios

Final energy demand – Energy Carriers



Energy efficiency: the EU can significantly reduce its energy demand by 2050

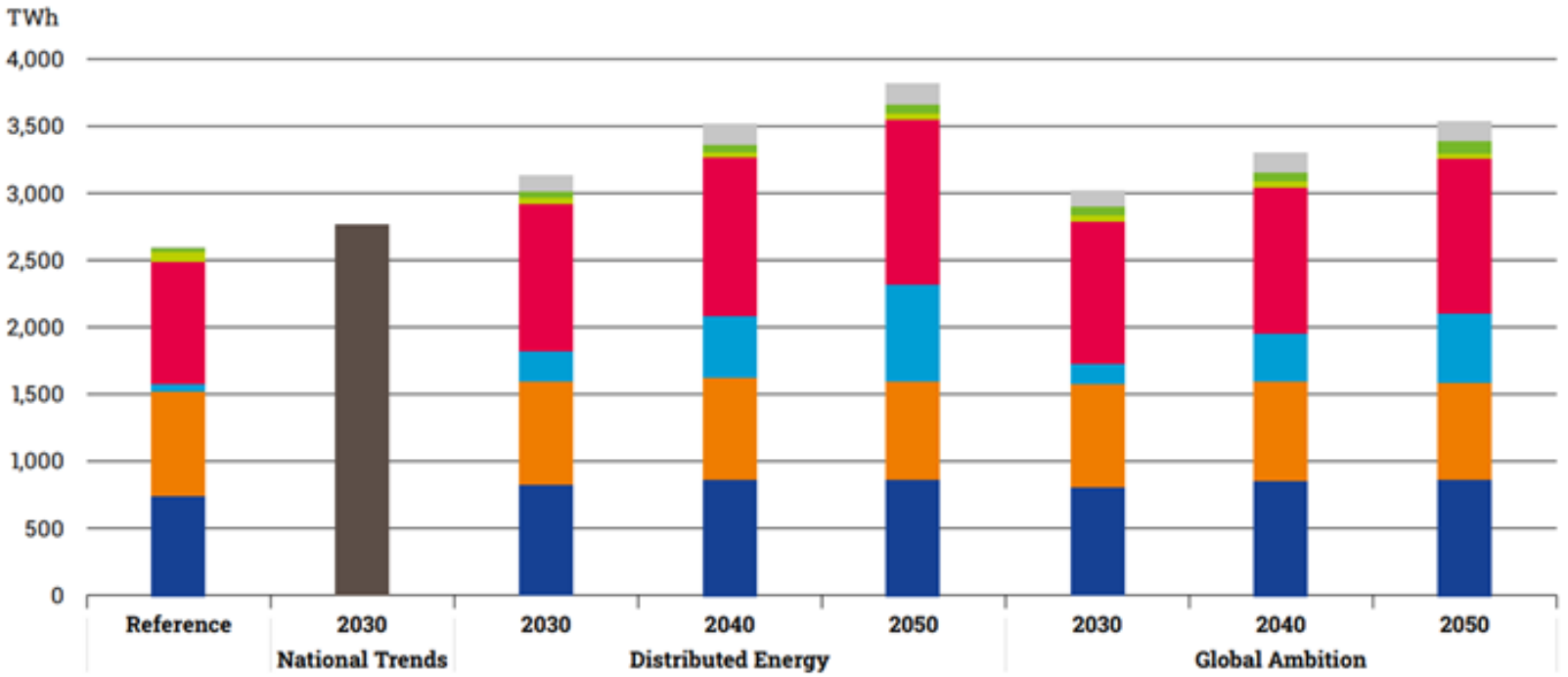
A wider transport perspective



- Decarbonisation of the whole economy requires to go beyond the direct electrification of light road transport with significant and complementary roles for hydrogen (FCEVs) and methane (ICE)

- Decarbonisation of **heavy road mobility, shipping and aviation** relies on a wide range of technology revolution on both the **vehicle and fuel sides**

Electricity demand

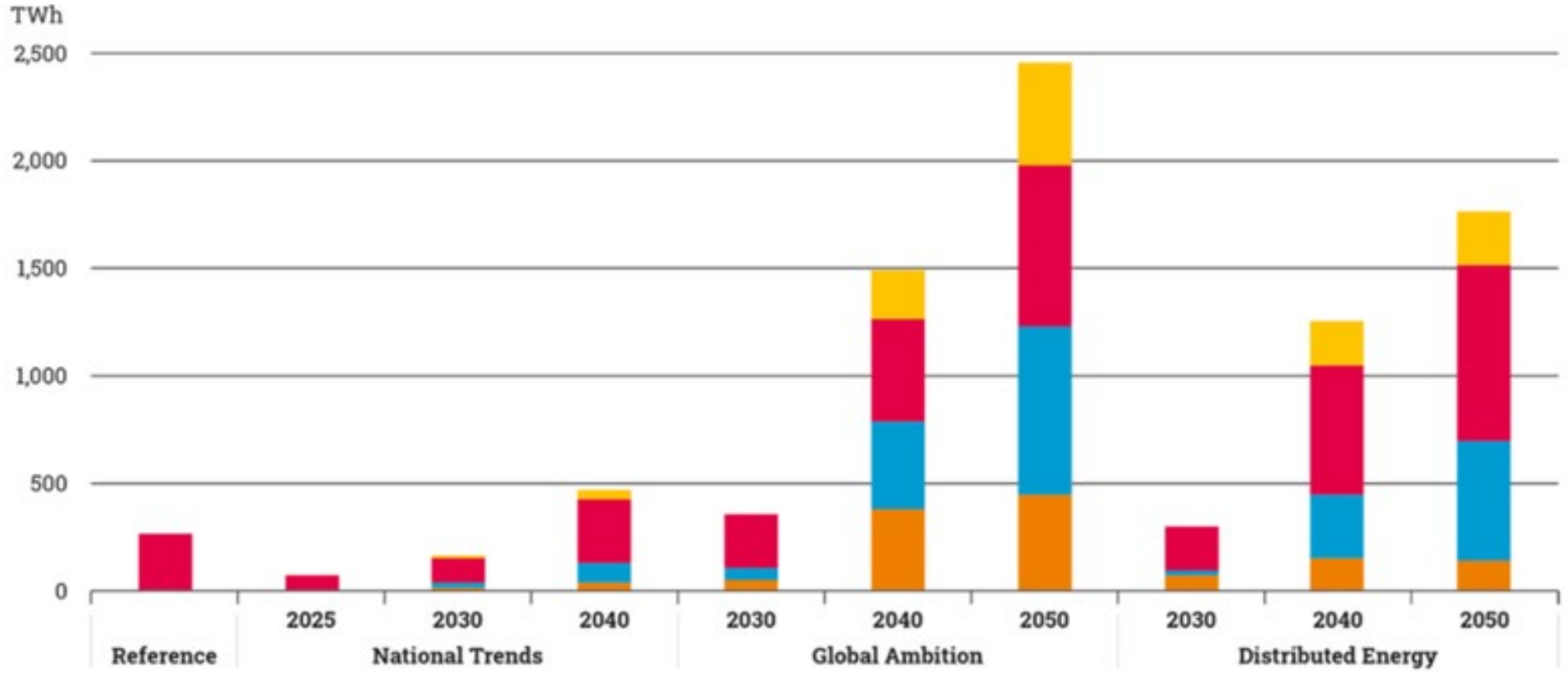


Electricity breakdown by sector

Others | Energy branch | Agriculture | Industry | Transport | Tertiary | Residential

- Final electricity demand increases by 1.4% and 1.8% per a. in Global Ambition and Distributed Energy
- Peak final electricity demand increases slightly faster (DE: +57% -> +51% ; GA: +57% -> +40%)
- The transport and industrial sectors show both:
  - The largest difference between scenarios with a higher electrification in Distributed Energy
  - Steepest increase: ten-fold in transport and around +30% in the industry

Hydrogen demand – by sector

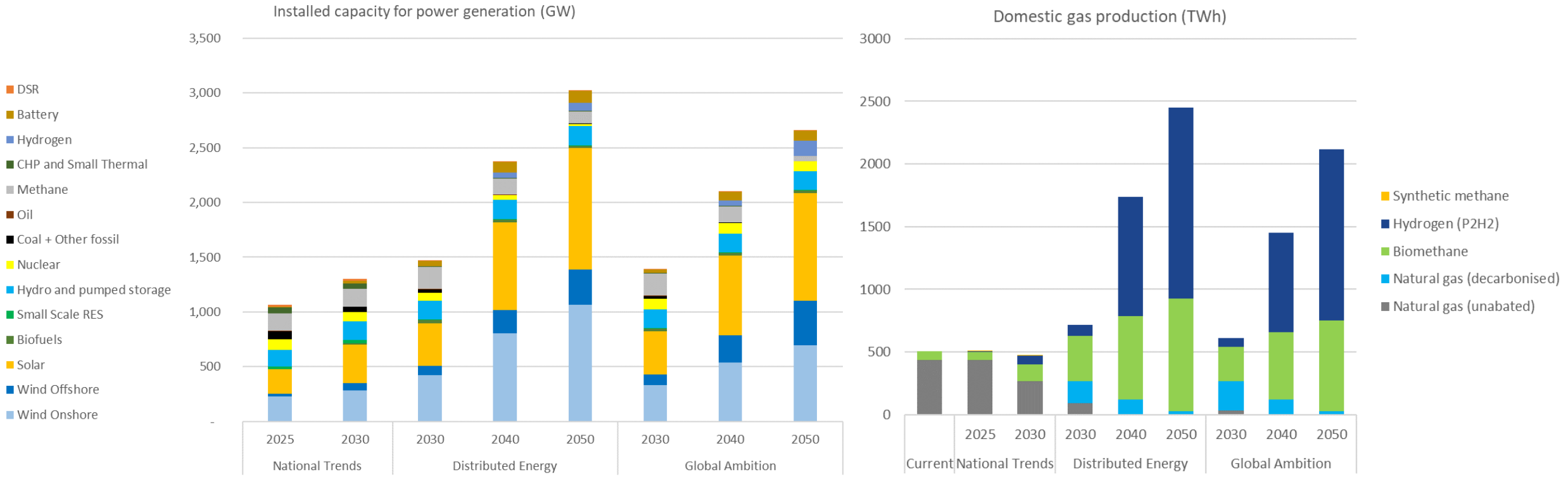


Hydrogen breakdown by sector

Residential & Tertiary | Transport | Industry | Agriculture | Consump. Energy Branch | Power Generation

Energy production

Ambitious development of renewables across Europe

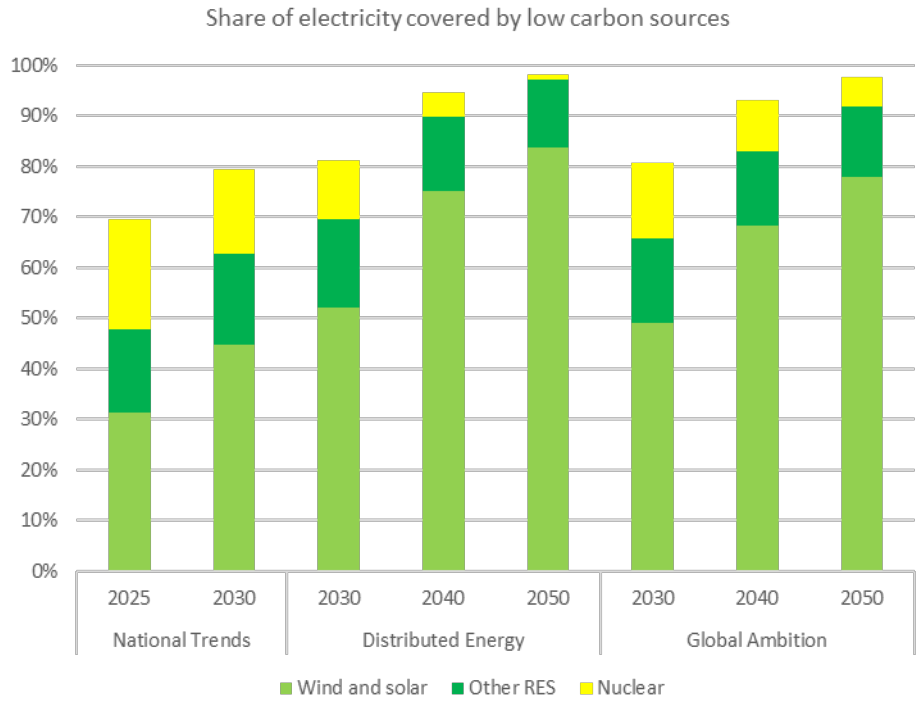


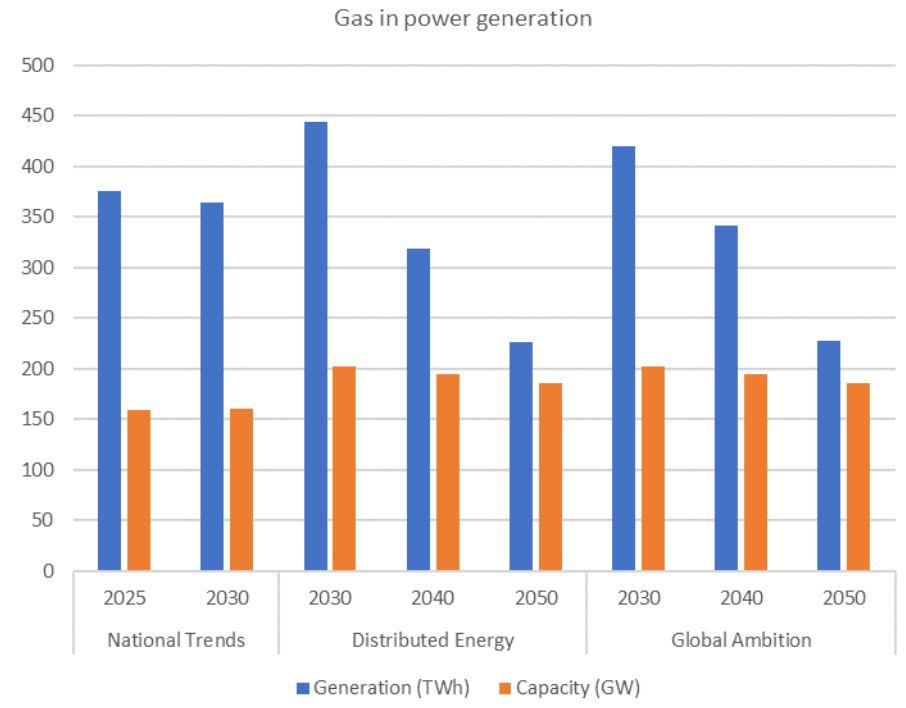
EU electricity and gas production rely on each other to reach carbon neutrality by 2040

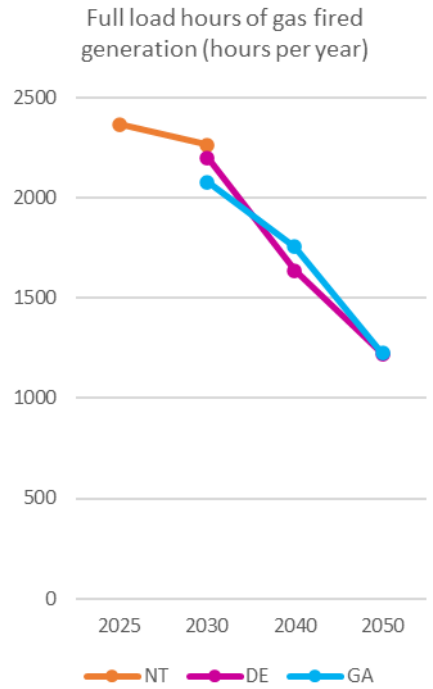
Electricity production

Sector integration can achieve net zero 2050 while ensuring security of supply

- Strong increase of renewable electricity production. Relatively high production from wind, due to high load factor.
- Gas fired capacities remain remain quite stable over time, but annual generation reduces. Power plants (methane and hydrogen) and other flexibility options remain essential back-up for variable solar and wind.



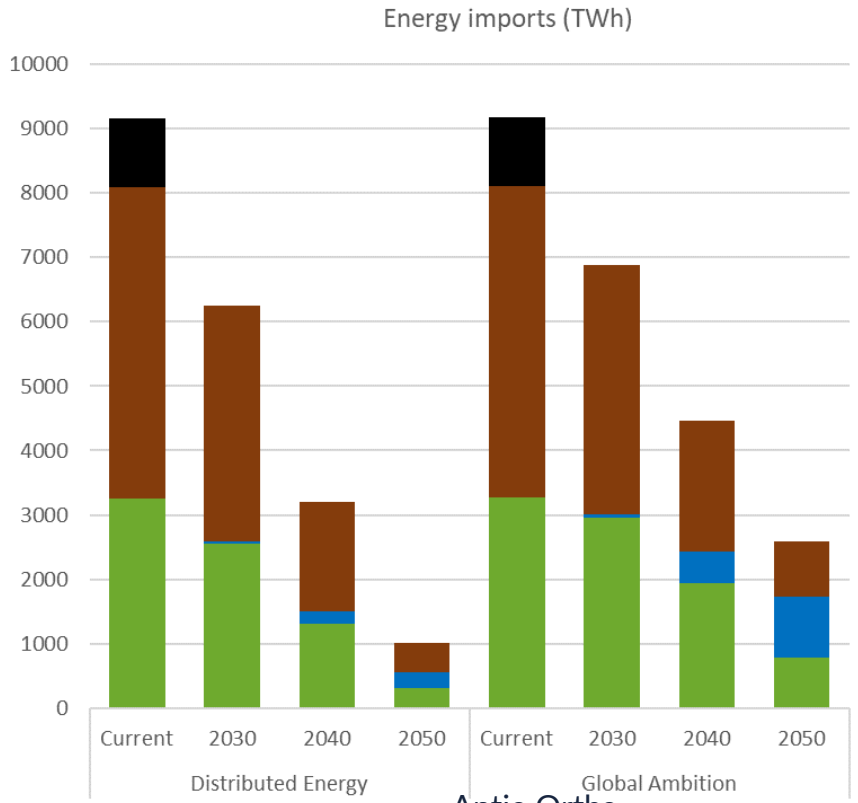


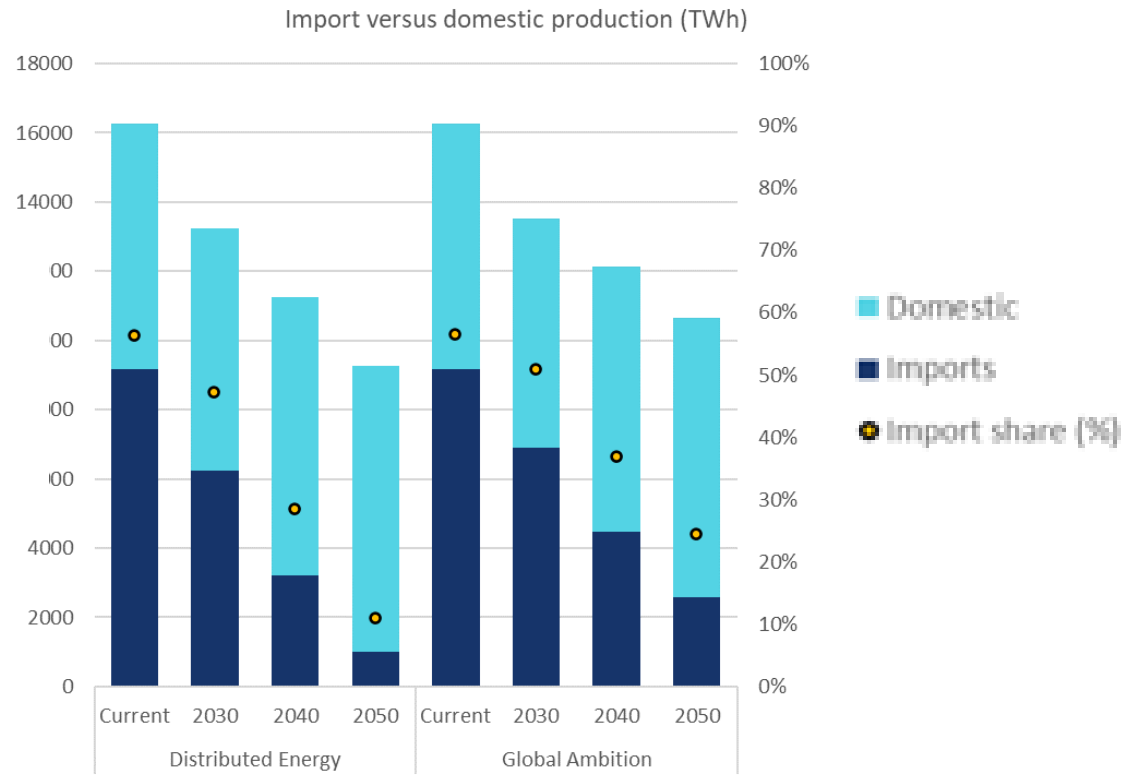


Note: An adequacy assessment is not yet performed at the draft scenario stage. As a result the capacity needed for security of supply might be underestimated

Energy imports

- With decarbonization efforts and development of RES, the EU becomes significantly less dependent on energy imports in both COP 21 scenarios.
- Import share in primary energy demand:
  55% today -> about 10% Distributed Energy, 25% in Global Ambition.



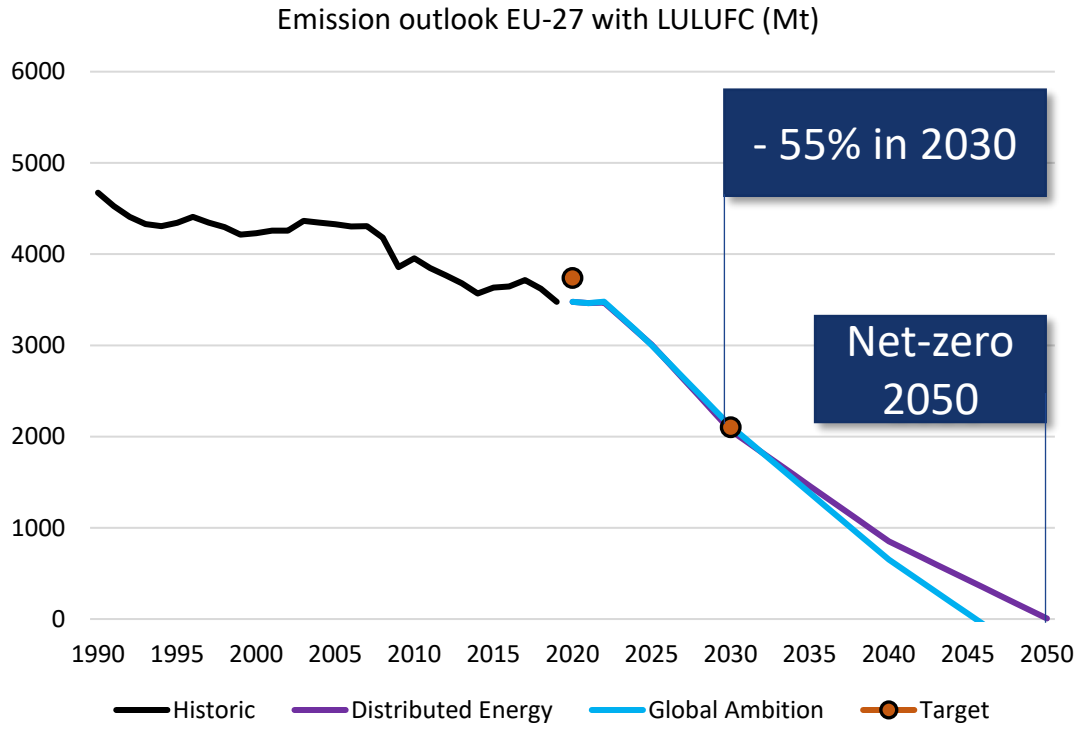


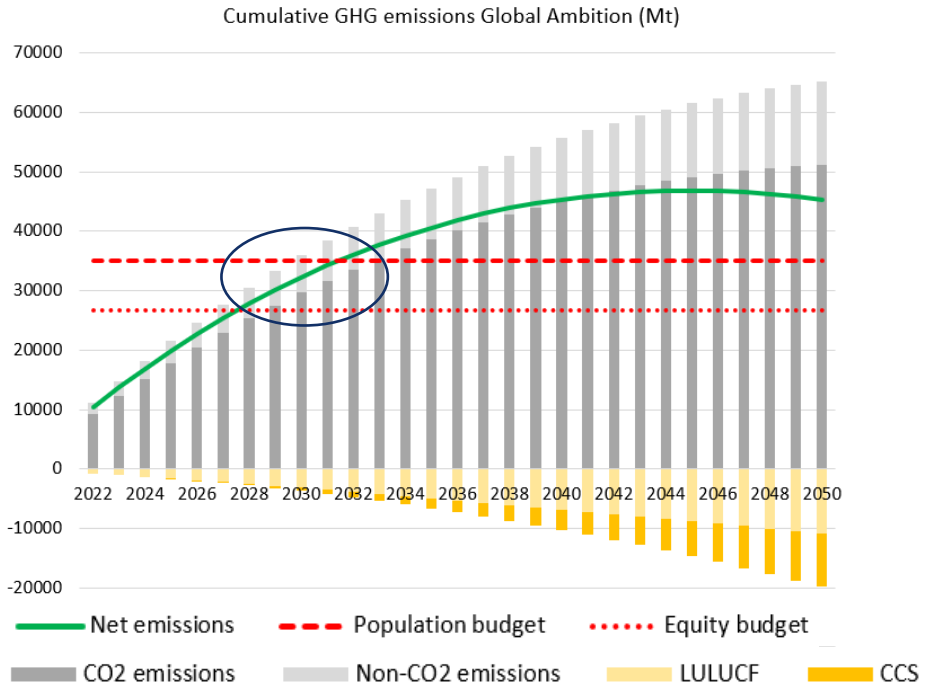
Can we make it ?

Decarbonisation pathways

COP 21 scenarios meet the 2030 targets and reach carbon neutrality by 2050.

Carbon budget overshoot by 2035 seems inevitable
Technologies to achieve negative emissions (CCS) are essential to meet the COP 21 objectives

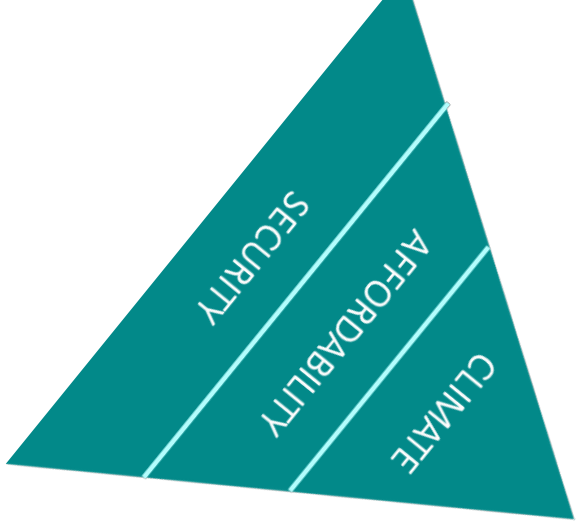




Net zero can be achieved by 2050

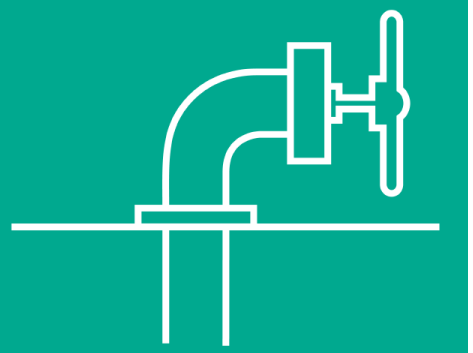
Innovation is key to achieve a sustainable energy future

MAIN TOOLS



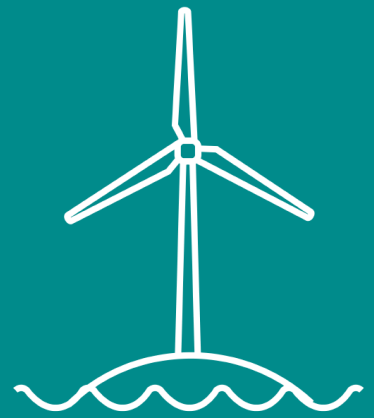
IN EUROPE

REPLACE GAS … AND BECOME ENERGY INDEPENDENT



FASTER RES EXPANSION

OFFSHORE AS RES-HUB FOR EU



USE OF H2 FOR HARD-TO ABATE SECTORS

THANK YOU!

ano@energinet.dk